

BISHOP (L.F.)

A NEW MEASUREMENT IN THE STUDY OF
FEVER.

BY

LOUIS F. BISHOP, A.M., M.D.,
OF NEW YORK.

FROM
THE MEDICAL NEWS,
January 28, 1893.



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FEVER.**

BY LOUIS F. BISHOP, A.M., M.D.,
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It has occurred to me that in the mensuration of fever we are deficient in terms. Since the beginning of medicine the duration of fever has been observed. More recently we have come to measure its height. It still remains for us to obtain a unit to record duration and height, when considered together.

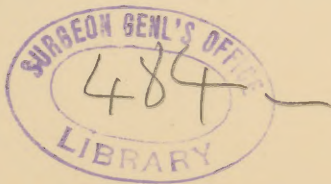
Not long ago electricians were confronted in a similar way by the need of a unit to express current.

They said empirically that the current produced by one volt against a resistance of one ohm, should be called an "ampère."

In like manner, let us say that the amount of febrile disturbance produced by an elevation of the temperature of the body one degree for one hour, shall be called an "hour-degree."

Thus we have a unit in terms of which we can express the duration and height of any febrile movement.

In the usual graphic method of recording temperature, by means of a curved line upon a chart, if the height of the curve above the normal line represent the elevation of temperature, and the



horizontal distance travelled by the curve represent the progress of time, then the area of the chart included between the curved line and the normal line will represent the number of hour-degrees of fever to which the patient has been subjected. Thus an elevation of temperature of one degree for twenty-four hours equals twenty-four hour-degrees. An elevation of two degrees for fourteen hours equals twenty-eight hour-degrees. An average elevation of three degrees for three weeks equals 1512 hour-degrees. If, during twenty-four hours, the temperature fall regularly from an elevation of two degrees to normal, the patient has suffered twenty-four hour-degrees. If the idea be clear, there can be no advantage in multiplying examples.

I am confident that this new quantity, when taken in conjunction with the records already in use, will be of material assistance in the study of cases of fever and of their treatment.

The estimation of the number of hour-degrees represented by a fever-chart offers inherent difficulties. The mensuration of so crooked a figure may well appal the unmathematical physician.

I have devised an approximative method.

In every temperature-chart the printed squares have a definite value in hour-degrees equal to the number of hours apart of the perpendicular lines multiplied by the number (usually a fraction) of degrees apart of the horizontal lines.

Rule: Count the number of whole squares included in the fever-area, and add half the number of squares only partially included. Multiply this number by the value in hour-degrees of one square,

and the result will be (approximately) the number of hour-degrees represented by the curve.

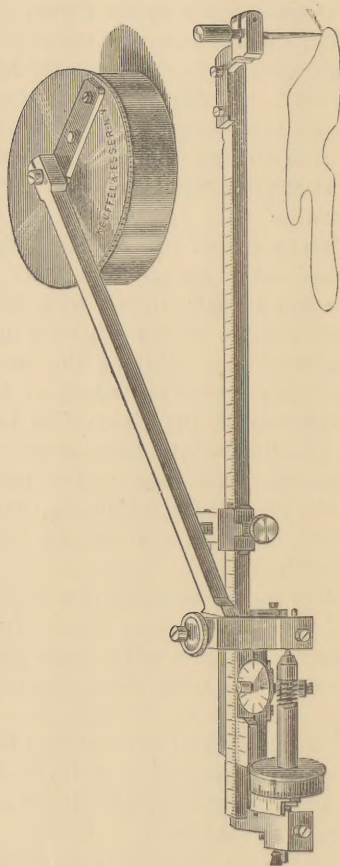
A much better method is by the use of an instrument which was brought to my notice by Mr. John A. Roebling, C.E., of New Jersey. The polar planimeter is an instrument used by engineers to measure the area of any figure, no matter how irregular. The instrument is shown in the accompanying illustration.

The chart being placed upon a flat surface, the needle is passed over the circumference of the figure, and the area is read directly from the instrument in square inches, or for whatever unit the instrument has been set. Having the area of the figure, it is an easy matter to reduce it to hour-degrees. In this way all the charts of a long case can be measured, and the total taken at one reading from the instrument. The value of our results will depend upon the accuracy of our charts. To obtain a curve of much value the temperature should be taken every four hours.

This estimation of the total amount of fever will be of especial value in checking the undue statistical value given to cases with high maximum temperatures which are often due to unimportant causes.

Though the application of this method is chiefly to the study and comparison of series of cases of which careful charts have been kept, it has an immediate lesson for every-day work.

In any febrile disease the comparison of the number of hour-degrees, from day to day, will convey a much clearer idea of the progress of the case than



Polar planimeter. (Copyright, 1887, by Keuffel & Esser.)

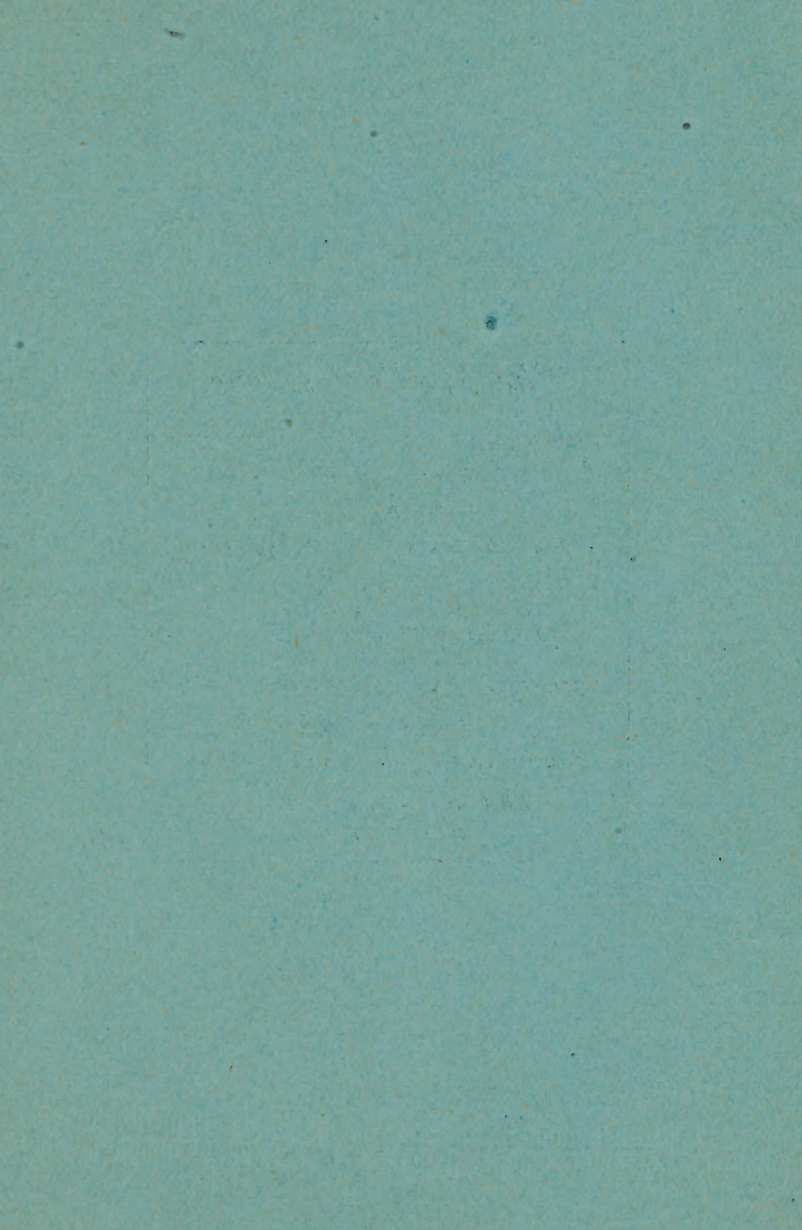
the mere inspection of a chart, or perhaps of a list of numbers.

After all, the importance of the matter is to bear in mind, from day to day, not only the present condition of our patient, but also what he has already endured.

A procedure which would be proper and useful to a patient in the latter part of an attack of enteric fever, who had endured 1000 hour-degrees, might be fatal to one who had endured twice as many.

Let us, then, consider not only the degrees, but also the hour-degrees ; not only the fever-height, but also the fever-area ; not only the quality, but also the quantity of the fever.

36 WEST THIRTY-FIFTH STREET.



The Medical News.

Established in 1843.

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The American Journal
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Established in 1820.

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